

**Deep Ultraviolet Light Emitting Diodes**

# Cost-effective Ultraviolet Light Source Improves Covert Communications, Aids in Medical Processes



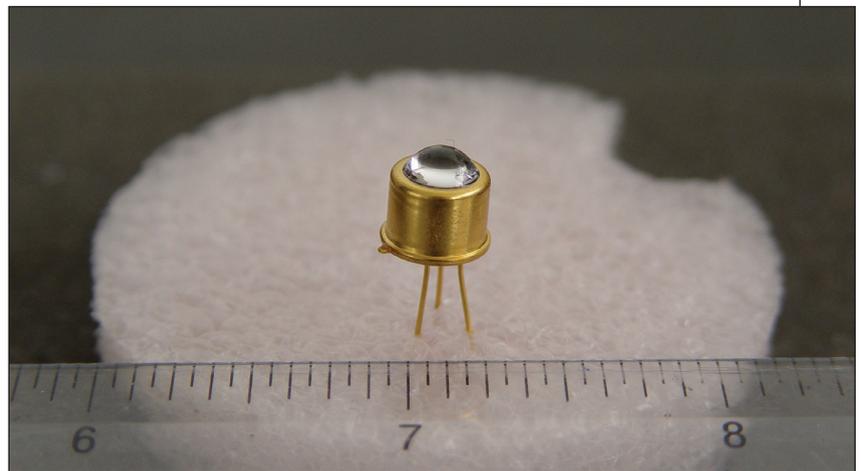
## Technology and Innovation

Non-visible (ultraviolet) light sources are increasingly important elements in embedded systems, including bio-agent sensors and covert short-range non-line-of-sight communications systems. Especially important are new types of ultraviolet light sources that are compact, fast to respond, consume little power, last a long time, and are cost effective.

Previous sources of deep ultraviolet (DUV) light were bulky, consumed a lot of power, provided only a limited set of emission wavelengths, and were more expensive.

Under this DARPA SBIR, Sensor Electronic Technology, Inc. (SET) developed proprietary technology to fabricate DUV light emitting diodes (LEDs) based on a wideband gap III-Nitride material system. When an electrical signal (typically between 5 to 7 volts) is applied to these devices, the LEDs emit light in the ultraviolet spectral range. Depending on the application, the wavelength can be tuned to any frequency in the range from 247 to 365 nm. Analyzing fluorescence response from bio-agents using LEDs with various peak emission wavelengths is expected to detect and identify agents. For example, if UV light with 340 nm or 280 nm wavelength (or both) is directed on Anthrax, it will fluoresce blue light.

Compared to other ultraviolet light sources such as lamps and solid state or



gas lasers, SET's DUV LED technology provides a number of advantages: small size, high speed, low power consumption, and low cost—all with a power output that is more than 20 times greater than previous technology.

In addition to its military applications, the company's DUV LEDs are also being used commercially for water/air/surface and tissue disinfection and sterilization, optical sensors, drug discovery and analysis, and more. Customers include:

- U.S. Army
- Department of Homeland Security
- More than 400 commercial customers worldwide using a wide variety of applications

## Joint Collaborations

SET has relied on a number of important collaborations to verify the company's technology achievements and foster relationships with future customers. These collaborations include:

Sensor Electronic Technology's innovative deep ultraviolet light emitting diodes

- Army Research Lab, which provided independent testing of SET's devices.
- University of South Carolina, which became a key member of the company's technical team.
- Hydro-Photon, which developed prototypes of portable water purification/disinfection systems based on SET's DUV LEDs.

### Lessons Learned

- Ensure that prototypes move smoothly into production by planning in advance for more resources between prototyping and the transition to production of qualified products.
- Avoid too much diversification in your SBIR research and development efforts.
- Try to become the best in bringing innovative products to the marketplace through fast development, sampling and sales of the prototype product.
- Aggressively market through conferences, trade shows, journals, the Internet and personal contact with potential customers.

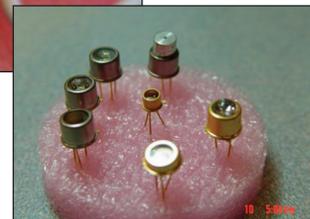
### Economic Impact

SET's technology breakthrough—a direct result of this DARPA SBIR—made SET the first commercial supplier of deep ultraviolet light emitting diodes. The SBIR helped to fund research and development and enabled SET to bring research-grade products to the marketplace. The company currently commands solid technological leadership in the field and remains the world's sole supplier of DUV LEDs with peak emission below 365 nm. SET's sales plan is to increase commercial revenue from nearly zero in 2003 to 50 percent of total revenue by the end of 2006.

The company's current challenge is to transition research and development and pilot production to volume manufacturing of qualified products. To accomplish this goal, the company is using a combination of government funding, strategic partnerships, and commercial sales.



SET's LEDs have 20 times the power of previous technology



### About the Company

Sensor Electronic Technology, Inc. was founded in 1999 by Dr. Remis Gaska and Dr. Michael Shur at the Rensselaer Polytechnic Institute Incubator (Troy, NY) after receiving government funding to develop and advance novel III-Nitride based devices and systems. In 2001, the company moved its operations to Columbia, SC to leverage the company's expertise with the newly established Photonics and Microelectronics Laboratory at the University of South Carolina.

These combined resources have allowed SET to expand operations into a 10,000 sq. ft. facility. SET became the first commercial supplier of DUV LEDs and is a leading supplier of high power, high frequency transistor materials. ■

### Company Information

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